

B. Claim Listing

The following claim listing replaces all prior versions and claim listings in the application.

1. (Currently Amended) A color measurement instrument comprising:

illuminator means for illuminating a sample, wherein said illuminator means is mounted to a first substrate and defines an axis of illumination;
color measurement means for measuring light reflected from said sample,
wherein said color measurement means is mounted to a second substrate and defines an axis of detection, wherein the second substrate is physically separated from the first substrate, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle;

a temperature changing element for changing a temperature of said illuminator means;

temperature sensing means for sensing the temperature of said illuminator means; and

control means responsive to said temperature sensing means for controlling said temperature changing element ~~to control the temperature of such that the temperature of said illuminator means is maintained substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument.~~

2. (Original) A color measurement instrument as defined in claim 1 wherein said illuminator means includes a light emitting diode (LED).

3. (Original) A color measurement instrument as defined in claim 1 wherein said illuminator means includes an illuminator and a thermally conductive base supporting said illuminator.

4. (Previously Presented) A color measurement instrument as defined in claim 3 wherein said temperature changing element and said temperature sensing means are mounted on said base.

5. (Currently Amended) A color measurement instrument comprising:
an illuminator, wherein said illuminator is mounted to a first substrate and defines an axis of illumination;
a color measurement engine, wherein said color measurement engine is mounted to a second substrate and defines an axis of detection, wherein the second substrate is physically separated from the first substrate, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle; and
control means for actively controlling a temperature of said illuminator such that the temperature is maintained substantially equal to a target temperature that is greater than an ambient operating temperature of the instrument, wherein said control means includes:

a temperature sensing element thermally connected to said illuminator;
and
a temperature changing element thermally connected to said illuminator.

6. (Original) A color measurement instrument as defined in claim 5 wherein said illuminator includes a light emitting diode (LED).

7. (Previously Presented) A color measurement instrument as defined in claim 5 wherein said illuminator further includes a thermally conductive base, said control means coupled to said base.

8. (Previously Presented) A color measurement instrument as defined in claim 7 wherein:

said temperature sensing element is supported by said base; and
said temperature changing element is supported by said base.

9. (Currently Amended) A method of measuring color comprising the steps of:
illuminating a sample with at least one illuminator in thermal communication with a thermally conductive base, wherein the at least one illuminator defines an axis of illumination;

measuring light reflected from the sample with a color measurement circuit,
wherein the color measurement circuit is mounted to a substrate and defines an axis of detection, wherein the substrate is physically separated from the base, and wherein the axis of detection intersects the axis of illumination to form a non-zero angle; and

controlling a heating element in thermal communication with the base to control asuch that a temperature of the at least one illuminator is maintained substantially equal

to a target temperature that is greater than an ambient operating temperature of the instrument to enhance the uniformity of at least one output characteristic.

10. (Original) A method as defined in claim 9 wherein:

the at least one illuminator comprises a light emitting diode (LED); and

the at least one output characteristic includes intensity, spectral energy distribution, and spatial distribution of the light from the LED.

11. (Currently Amended) A method as defined in claim 9 wherein said controlling step includes:

measuring ~~the-a~~ temperature of the base;

comparing the temperature of the base with ~~a desired temperature~~the target temperature; and

controlling the heating element based on said comparing step.

12-20. (Canceled)

21. (Currently Amended) A color measurement instrument, comprising:

~~a substrate;~~

a temperature sensor in thermal communication with ~~the-an~~an illuminator substrate;

a heating element in thermal communication with the illuminator substrate;

a temperature-sensitive illuminator in thermal communication with the illuminator substrate;

a temperature controller coupled to the temperature sensor and the heating element; and

a light-sensing device mounted to a sensor substrate.

22. (Previously Presented) The color measurement instrument of claim 21, wherein the temperature sensor is a thermistor.

23. (Previously Presented) The color measurement instrument of claim 21, wherein the heating element is a resistor.

24. (Previously Presented) The color measurement instrument of claim 21, wherein the temperature-sensitive illuminator is a light emitting diode.

25. (Previously Presented) The color measurement instrument of claim 21, wherein the light-sensing device is a photodiode.